



# OFFSHORE SUBSTATION DESIGN

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**RAMBOLL**

# OFFSHORE SUBSTATION DESIGN

## COMPLETE SUBSTATION DESIGNS TAILORED FOR YOUR OFFSHORE WIND FARM

Ramboll is the world leader in offshore foundation design for wind turbines. Our specialised engineers carry vast expertise within development and design of offshore facilities.

This covers minimum facilities with low manning frequency as well as larger facilities that are permanently manned with frequent access via sea or air.

### Offshore substations

More and larger wind farms are being located offshore. The capacity of these wind farms is of the order of several hundreds of MW. To minimise the electrical transmission losses and the cable costs, the turbines in such wind farms are electrically connected to an offshore substation provided with a step-up transformer. The transmission to shore is then achieved by an HV AC connection or an HVDC link.

With Ramboll as your partner, our extensive offshore experience will be implemented into the design of your substation with strong focus

on safety and cost effective design. The development and design of the substation is highly dependent on the actual location and the operation and maintenance philosophy for the substation and for the wind farm.

### Multi-discipline services

Ramboll provides multi-disciplinary engineering consultancy for all areas of the offshore substation:

- definition of design standards and codes
- general layout development with consideration of safety, mechanical handling, operation and maintenance
- implementation of electrical equipment such as step-up transformer, reactors, GIS switchgear, LV-switchgear, UPS system and control system
- substructure design including j-tubes for cables, boat landings and foundation

- specification of all auxiliary equipment such as cranes, emergency diesel systems and workshops
- accommodation facilities and heli deck if required
- installation engineering for topside and substructure as well as cable pull-in planning

### Substructure design

The substructure design can be a simple steel mono pile, a larger jacket for deeper waters and higher topside loads or it can be a concrete gravity base structure. At Ramboll we have more than 25 years of experience within offshore substructure design.

The structural design is carried out using Ramboll's own state-of-the-art software programme ROSAP. All topsides and substructure design are performed within a fully integrated multi-discipline 3D system (e.g. PDS, PDMS, Tekla, Solidworks or SmartPlant 3D).

### Offshore wind farm substation projects

- Anholt substation - topside and substructure - Detailed design (DK)
- Horns Rev 2 substation - topside and substructure – FEED (DK)
- Robin Rigg substation - topside and substructure – Detailed design (UK)
- Nordergrunde substation - topside and substructure – Detailed design (D)
- Sheringham Shoal - substation substructure – Detail design (UK)
- Greater Gabbard (UK)
- Bligh Bank (UK)
- NordSee Ost - substation substructure – Concept study (D)

### More information and contact

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## Design codes

The designs can be performed according to any acknowledged standard e.g. DNV, Germanischer Lloyd, IEC, NFPA, ISO or other international codes, as required to have the project certified by a Certifying Authority.

## Optimum solutions

Ramboll is the ideal partner for carrying out studies to determine the kind of facility that is most advantageous at a given location.

Our long track record of feasibility studies, front-end engineering design and detailed designs for clients' operating facilities offshore will ensure that we will develop the optimum solution.

## Anholt Wind Farm

Our most recent major substation project is the Anholt substation in Denmark. The 400MW wind farm will become one of the largest in the world today.

## WHO ARE WE?

Ramboll is a leading engineering, design and consultancy company founded in Denmark in 1945. Today we employ approximately 9,000 ambitious experts with a strong presence in Northern Europe, India, Russia and the Middle East. With almost 200 offices in 20 countries we emphasise local experience combined with a global knowledge base. We constantly strive to achieve inspiring and exacting solutions that make a genuine difference to our customers, the end-users and society as a whole.

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